

APPLICATION OF THE OTTAWA ANKLE RULES TO EVALUATE ANKLE AND  
FOOT INJURIES BY ARMY NURSE PRACTITIONERS

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## ABSTRACT

Ankle injuries are the most common orthopedic injury, which includes during deployment situations. Ankle films account for 10% of all x-rays ordered in emergency departments. Ninety-five percent of all ankle injuries are x-rayed, and less than 15% of those are found positive for a fracture. The U.S. and Canada spend approximately 500 million dollars per year on ankle x-rays alone. The Ottawa Ankle Rules (OAR) have been validated and have been found by eight different research studies to be between 93% and 100% sensitive. Army Nurse Practitioners (ANP) are expected to be prepared for deployment, to practice judicious use of resources, and provide quality patient care. During deployment, the ANP should expect to care for male and female soldiers. Therefore, this study is relevant to Adult, Family, and Women's Health Nurse Practitioners. The study was conducted via a survey, which was designed by the researcher using the Ottawa Ankle Rules as a guideline. The exploration of the utilization of the Ottawa Ankle Rules by Army Nurse Practitioners was accomplished in this study through a quantitative, descriptive research methodology. The population included all active duty Army Adult, Family, and Women's Health Nurse Practitioners. Experts reviewed the tool. The total population of 105 was included in the mailing of the survey, and 90 surveys were returned. Data was analyzed using the comparative method, and reported in order to describe the population, and the tendencies of that population to use the Ottawa Ankle Rules.

Key Words: Ottawa Ankle Rules ankle injuries Army nurse practitioners  
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by

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## PREFACE

This study was conducted to determine information regarding the utilization of clinical guidelines by Army Nurse Practitioners. It was designed to familiarize those who read it with the Ottawa Ankle Rules, in hope that more providers would utilize the OAR.

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To God the Father. To my husband, Thomas; my parents, Ernest and Marjorie (Moss) Wall; and my research committee: Dr. Ledbetter, Dr. Levine, and Dr. McMullen.

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## CHAPTER ONE: INTRODUCTION

### Background

The purpose of this study is to determine if Army Nurse Practitioners (ANPs) are aware of and following a set of clinical guidelines, called the Ottawa Ankle Rules (OAR), to evaluate ankle and foot injuries when deciding whether radiography is needed. Ankle injuries are the most common joint injuries (Stiell, Greenberg, McKnight, Nair, McDowell, & Worthington, 1992). Lakhanpal, Freas, and Ramoska (1995) state, of all sports related orthopedic injuries presenting to the Emergency Department (ED), ankle sprains are the most frequent. Ankle films account for 10% of all x-rays taken in the ED. Thus the costs associated with management of ankle trauma are substantial. Radiography for ankle injuries alone cost the United States (US) and Canada 500 million dollars per year; yet the presence of a fracture is below 15% (Anis, Stiell, Stewart, & Laupacis, 1995; Stiell, et al., 1992).

A group of Canadian physicians and researchers developed the OAR in 1992 (Stiell, et al., 1992). Previous studies had been done regarding clinical decision rules for the use of radiography were performed, but none so extensively as the OAR. One research investigation by Brand and co-investigators (1982) was completed at Yale University School of Medicine. They found that by using the protocol they had developed they could safely predict who needed x-rays. Earlier than that, the British were teaching the diagnosis and treatment of ankle injuries without x-rays in the 1960 s (Lettin, 1963).

The team of Canadian physicians who developed the OAR was headed by Dr. Ian

Stiell, at the Department of Epidemiology, Ottawa Civic Hospital, Ontario, Canada, and was supported by the Ontario Ministry of Health (OMH). Their study of the OAR showed that the rules were 100% sensitive. They cautioned that, No clinical decision rule can be considered valid until it has been prospectively assessed because many guidelines do not perform as well when tested on a new group of patients. (Stiell, et al., 1992, p. 388).

The mindset of today's Army Medical Department (AMEDD) is one of cost cutting while providing quality patient care. This is also the mindset in the civilian sector. With the introduction of clinical guidelines from the National Advisory Council for Health Care Policy, Research, and Evaluation (AHCPRE), the US is working toward standardizing health care. The OAR could be used to standardize the evaluation of ankle injuries in the US. They are currently in widespread use in Canada, and have been adopted by the British Columbia Council on Clinical Practice Guidelines (1995). Most importantly, the OAR can be applied safely and easily, resulting in decreased costs, patient irradiation and waiting times (McBride, 1997).

Clinical guidelines allow health care providers to deliver high-quality, cost-effective care (National AHCPRE, Interim Report, September 1995, p. 1). In this report, Medistat, Inc., a private research and consulting firm, found that if recommendations were applicable to one patient in five the implications would be very substantial. For example, employers and other private sector payers would save 370 million dollars, if providers used AHCPRE guidelines for low back pain consistently. This amount was estimated for unnecessary treatments, testing, such as radiographs, CT scans, and MRIs

for low back pain as required by the AHCPR guidelines. Medistat specifically looked at the working-age population. The OAR, if used, would save millions of dollars. It is not the high-cost procedures that are taking the nation's healthcare dollars, but the small items (Larsen, 1996).

In the Army, ANPs are tasked with administrative duties, to include resource management (Kennedy, Hill, Adams, & Jennings, 1996). ANPs placed in these types of roles will be in a position to evaluate every avenue for cutting costs, while continuing to provide safe and appropriate patient care. With the dramatic changes in healthcare, one of which is decreased resources; the responsibility for providing quality care remains (Duff, Kitson, Seers, & Humphris, 1996). The increasing emphasis placed on quality assurance and cost containment demands that ANPs are knowledgeable regarding quality assurance, participate in cost containment activities, and maintain a standard of continual professional development (Williamson, Hudson, & Nevins, 1982). As well as the development of these qualities, ANPs must develop keen clinical decision making skills (Lipman & Deatricks, 1997). These skills are necessary for professional development, cost-effectiveness, and maintaining the ability to function competently in a deployed status (Kennedy, Hill, Adams, & Jennings, 1996). Sound clinical decision-making skills and clinical guidelines can assist ANPs in the delivery quality health care, cost-effectively (Duff, et al., 1996). Kennedy, Hill, Adams, and Jennings (1996) clearly indicate that the Army's Advanced Practice Nurses (APNs) must be involved in the transfer of research findings to practice.

Clinical guidelines, decision-making, cost-effectiveness, and role development, in

relation to this study, are related to each other. Along with these concepts, ANPs must also be concerned about functioning in a deployed status. The possibility of deployment to a remote location and caring for adults is part of the ANPs reality (Kennedy, Hill, Adams, & Jennings, 1996). Therefore the OAR are applicable to the knowledge base of Women's Health, Family, and Adult nurse practitioners (NP). At a remote location the ANP may not have radiographic capabilities. It is at that time, the OAR, would provide a guideline for safe and effective decision-making. Leaving the ANP free to make an effective decision with regard to an injured soldier. One possibility would be to treat and return the soldier to parent unit without radiographs. The other option would be to treat and transfer the soldier to a higher echelon of care for further evaluation. The ability to make the decision would be critical to practicing judicious use of resources. If the ANP had the knowledge and ability to treat and return, if appropriate, then the soldier's parent unit would receive a positive outcome and have a greater chance of maintaining unit integrity.

Prudent use of resources is of utmost importance whether during combat or operations other than war (OOTW). The ANP would be responsible for diagnosing the patient with the ankle or foot injury; and for judiciously using available resources. What resources could be saved by having the knowledge to treat and return? Depending on location, moving a soldier to a higher echelon of care could involve ground or air transport, and the use of manpower, equipment, and fuel. These could eventually add up to a significant amount of resources, as well as lost manpower to the parent unit. This type of situation could be avoided if the ANP were to use the OAR.

Nursing, more than other healthcare professions, is reality based and responsible for teaching the patient (Champion, 1989). The OAR are reality based, and have been shown to work well when combined with patient education. For example, there may be times when patients would want an x-ray, even if according to the OAR they did not need one. The benefit to education and consideration of the patient's preference would be increased patient satisfaction (Woolf, 1997). Stiell and colleagues (1992) found that most people would choose not to have an x-ray done if it most likely was not needed.

The Ottawa Ankle Rule Project was conducted in multiple phases (Stiell, 1996). This was done in order to test reliability, validity, sensitivity, and effectiveness (Stiell et al., 1992). The group of Ottawa emergency physicians and researchers, supported by the OMH, published the OAR in the Journal of the American Medical Association in 1994 (Stiell, et al). The OAR include an 8-point algorithm that directs the provider to a decision about whether to order radiography. The OAR apply to all adults over 18 that present with pain or tenderness secondary to blunt ankle trauma due to any mechanism of injury, including twisting, falls, and direct blows (Stiell et al., 1994, p. 828). Patients who were younger than 18 years, pregnant, had isolated injuries of the skin, were referred from outside hospital with radiographs, whose ankle injury occurred more than ten days previously, or who had returned for reassessment of the same injury (Stiell et al., 1994, p. 828) were excluded.

The ANP should order ankle radiographic series if there is any pain in the malleolar zone and any of the following findings: a) bone tenderness at the posterior edge or tip the lateral malleolus; b) bone tenderness at the posterior edge or tip of the

medial malleolus; c) inability to bear weight immediately and in the provider's presence. The ANP should order foot radiographic series if there is any pain in the midfoot zone and any of the following findings: a) bone tenderness at the base of the fifth metatarsal; b) bone tenderness at the navicular; c) inability to bear weight both immediately and in the provider's presence (Stiell et al., 1994).

Findings of this study will provide information about the familiarity of ANPs with the OAR, and their use of them. This information will be valuable for determining the type of professional education that practicing ANPs may require, specifically in relation to clinical guidelines. It is the hope of the researcher that this study will bring to light issues of readiness in regard to ANPs. Also, this study is designed to play a role in educating ANPs about the OAR, and their use in the standardization of x-raying ankle and foot injuries.

### Problem

There is lack of consensus concerning the evaluation of ankle injuries, as well as the use of clinical guidelines. With the advent of x-rays in the 1900s, health care providers (HCPs) have used radiography to establish the presence of fractures (Stiell, et al., 1992). Studies show that over 95% of ankle injuries are radiographed, and the number of fractures found are less than 15% (Anis, et al., 1995; Stiell et al., 1992). Stiell and colleagues (1992) found that HCPs lacked confidence regarding their assessment skills, and with the demand by patients, and the fear of lawsuits, the use of radiography has remained high.

Clinical guidelines may not affect clinical practices or health outcomes. This may

be due to providers' attitudes toward clinical guidelines. Tunis, Hayward, Wilson, Rubin, Bass, Johnston, & Steinberg (1994) contend that providers may relate the use of clinical guidelines to a first encounter with guidelines during peer review, utilization management, or quality assurance programs. These types of activities may not be perceived positively. The provider may perceive the clinical guidelines as a threat to their independent decision-making.

The OAR are designed to dispel confusion about whether an ankle injury requires radiography and to help HCPs safely reduce the amount of radiography used to assess these injuries. In 1996, Stiell reported, Use of these rules reduced radiographic examinations by 28% for the ankle and 14% for the foot. (p. 478). It was also found that patient waiting time was decreased, patients had decreased cost in relation to the injury, they maintained their satisfaction with care received, and they were not more likely to have radiography done after their initial visit. These rules, adopted by British Columbia as Clinical Guidelines, would allow the ANP to continue to provide safe, high quality, and cost-effective health care. Hence, the purpose of this study is to determine if ANPs are using Ottawa Ankle Rules.

#### Research Question

Are the Ottawa Ankle Rules being used to evaluate ankle and foot injuries by Army nurse practitioners?

#### Theoretical Framework

The theory of reasoned action proposes that the intention to perform a behavior is often the best predictor that the behavior will occur. This theory has been used to predict

and explain human behavior (Azjen & Fishbein, 1980). Intention to perform a certain behavior is related to an individual's attitudes toward the behavior and that individual's subjective norm (Blue, 1995). The subjective norm is the individual's belief about what others of importance think. For example, the individual may refer to words remembered from a previous instructor or preceptor, or rely on previous experiences or input from peers (Larsen, 1996). The consequence of a behavior and how it fits into that individual's belief system are important issues. Behaviors are performed because of attitudes, subjective norm, and intention, not because of demographic or personality characteristics (Azjen & Fishbein, 1980; Blue, 1995). According to the theory of reasoned action, behavior is under voluntary control, and therefore, an independent choice. Azjen & Fishbein believe behavior that is under volitional control can be predicted (Azjen & Fishbein, 1980).

The practice of using the OAR is under the voluntary control of the ANP. Various reasons may influence the ANP to utilize the OAR, such as the views of other HCPs toward the OAR. In the clinical setting, ANPs can practice quality care and cost-containment by using the OAR. If ANPs believe that quality care and cost-containment are important, it is more likely they will utilize the OAR. This study will provide information about ANPs' knowledge and adherence to the OAR. Such information will be useful to determine educational needs, with the additional benefit of creating discussion about deployment issues.

The theory of reasoned action provides a simple, but useful, framework for a descriptive study of adherence to a set of clinical guidelines by ANPs. This study will

describe the demographics of the respondents and adherence to the OAR.

### Conceptual and Operational Definitions

For the purpose of this study the following definitions will be used:

Algorithm. A formula for solving a problem. Specifically the OAR, which are an eight-point algorithm. The OAR, for the purpose of this study, are only applied to those patients who fit into the group of patients defined. Excluded are patients younger than 18 years, pregnant, had isolated injuries of the skin, were referred from outside hospital with radiographs, whose ankle injury occurred more than ten days previously, or who had returned for reassessment of the same injury (Stiell et al., 1994, p. 828). In medicine, an algorithm is a set of steps used in diagnosing and treating a disease (Thomas, 1992).

Ankle injury. An injury sustained in the malleolar zone (Stiell, et al., 1992). OAR for the purpose of this study are used for assessment of adults over 18 that present with pain or tenderness secondary to blunt ankle trauma due to any mechanism of injury, including twisting, falls, and direct blows . ( Stiell et al., 1994, p. 828). Ankle radiographic series are required if there is any pain in the malleolar zone and any of the following findings: a) bone tenderness at the posterior edge or tip the lateral malleolus; b) bone tenderness at the posterior edge or tip of the medial malleolus; c) inability to bear weight immediately and in the provider s presence.

The ankle joint is formed by three bones: the distal ends of the tibia and fibula, the talus; and two groups of ligaments: external and internal collateral ligaments. The internal collateral ligament has four elements that form the deltoid ligament. The external collateral ligament has three elements and is the most common area injured. These are

called inversion sprains, and they affect the anterior talofibular and calcaneofibular ligaments. Eversion sprains more commonly cause bone damage. The most common bone damage being the avulsion of the tibia and/or medial malleolus (Tandeter & Shvartzman, 1997).

Army nurse practitioner. An active duty Army officer who is a nurse practitioner with a specialty of adult, women s health, or family.

Clinical guidelines. Systematically developed statements to assist the practitioner and the patient with health care decisions (Tunis et al, 1994). Research based is a defining attribute of clinical guidelines (Duff et al, 1996, p. 888). They are helpful in the design of a plan to manage clinical problems, and serve as map for quick and effective patient care. They also serve to provide consistent care, and are especially helpful for clinical problems in the gray zone (Larsen, 1996, p.23). One of the main contributing factors to the development of clinical guidelines is the need for a quick and effective way for health professionals to stay abreast of new developments in the health care field.

Cost-effectiveness. This refers to appropriate care for a specific health care problem, and appropriate utilization of resources. Utilization of the OAR can result in significant health care savings, in spite of litigation costs due to missed fractures. These savings include aspects such as, radiography, waiting time, lost productivity, and medicolegal costs. In the U.S. anticipated savings range from \$614,000 to over \$3 million per 100,000 patients per year (Anis, Stiell, Stewart, & Laupacis, 1995). Cost-containment was not the issue behind the development of the OAR (Graham, 1998), but cost-containment has been a driving force behind the development of other clinical

guidelines (Duff et al., 1996).

Foot injury. An injury sustained in the midfoot zone in adults over 18 that present with pain or tenderness secondary to blunt ankle trauma due to any mechanism of injury, including twisting, falls, and direct blows (Stiell et al., 1994, p. 828). Foot radiographic series are required if there is any pain in the midfoot zone and any of the following findings: a) bone tenderness at the base of the fifth metatarsal; b) bone tenderness at the navicular; c) inability to bear weight both immediately and in the provider's presence.

Ottawa Ankle Rules. A set of clinical guidelines used to determine whether radiography is required for acute ankle/foot injuries (Stiell et al., 1992).

Radiography. An ankle and/or foot x-ray.

Sensitivity. Sensitivity is associated with effect size (Burns & Grove, 1997, p. 337). It is used to determine the amount of change that will change or affect the outcome of a study. Burns and Grove state, it may be judged in terms of the ability of the system to resume a steady state after a disturbance in input (p.337).

### Assumptions and Limitations

The sample will be limited to all active duty Army Nurse Practitioners, with a specialty of adult, women's health, and family. The total number is 105 and a participation rate over 50% is expected.

### Assumptions

1. ANPs are aware of the OAR.
2. They will answer the questionnaire independently and honestly.

### Limitations

1. The study is limited to ANPs.
2. The Advisory Council for Health Care Policy, Research, and Evaluation has not adopted the OAR as clinical guidelines.

## CHAPTER TWO: LITERATURE REVIEW

### Introduction

There is inconsistency in the U.S. medical community regarding clinical practice guidelines (Tunis, et al., 1994). However, a study by Graham and coworkers found that Canadian Emergency Medicine Physicians are supportive of clinical decision rules (Graham et al., 1998). The OAR provide information in a straightforward and detailed manner regarding decision rules for ankle and foot injuries; and the use of radiographic studies. This study is directed at the utilization of those rules. This chapter will describe the techniques and utilization that are the focus of the present research. The discussion will include the OAR and the various factors that are involved in the decision-making process.

### Ottawa Ankle Rules

The goal of developing the OAR was to yield a sensitivity of 100% (Laupacis, Stiell, Anis, & Stewart, 1996); and to allow clinicians the ability to be more selective in their use of radiography (Stiell et al., 1992). Three original studies by Stiell and coworkers yielded 100% sensitivity (McBride, 1997).

Stiell and colleagues (1992) performed the first study in two university hospital emergency departments. The goal was to develop decision rules that would predict fractures in patients with ankle injuries. . The pilot study had 155 adults, 750 in the main study. All presented with acute blunt ankle injuries. All 70 significant malleolar fractures found in 689 ankle radiographs were found among people who were age 55 or older, had pain near the malleoli, had localized bone tenderness of the posterior edge or

tip of either malleolus, or were unable to bear weight both immediately after the injury and in the emergency department. The results of this study demonstrated 100% sensitivity for what are now called the OAR, and would allow a 36% reduction of radiographs ordered. In the same study, all 32 significant midfoot fractures from 230 foot radiographs were found among patients with pain in the midfoot and bone tenderness at the base of the fifth metatarsal, the cuboid, or the navicular.

Stiell et al., (1993) performed the second study in two emergency departments in two university hospitals. The objective of this study was to validate and refine clinical decision rules that assist the clinician in the use of radiography for acute ankle injuries. The subjects were a convenience sample of 1,485 adult patients with acute ankle injuries. The refined OAR were found to 100% sensitive, and the probability of a fracture if the corresponding decision rule were negative was estimated to be zero for the ankle and foot injuries.

Stiell and coworkers (1994) performed the third study in the emergency departments of a university (intervention), and a community hospital (control). The sample was all 2,342 adults seen with acute ankle injuries during five-month periods before and after intervention. There was a relative reduction in ankle radiograph by 28% at the intervention hospital, but an increase by 2% at the control hospital. Foot radiography was reduced by 14% at the intervention hospital, but increased by 13% at the control hospital. At the intervention hospital, those discharged without radiography in comparison to those who had radiography spent less time in the emergency department, (80 minutes vs. 116 minutes), had decreased total medical costs for physician visits and

radiography, but did not differ in satisfaction with emergency physician care.

Five other validation studies were done. Four were performed in emergency departments. The first study resulted in 100% sensitivity, with 71 patients enrolled. It was conducted in the emergency departments of a university hospital and a community hospital with a combined annual volume of 100,000 patients. Pigman and coworkers (1994) found that ankle and midfoot fracture radiographs could have been reduced by 19% if the OAR had been applied. The second research study resulted in 93% sensitivity, with 350 patients enrolled (Kerr, Kelly, Grant, Richards, O Donovan, & Basire, 1994). The third research study resulted in 94% sensitivity, with 484 patients enrolled. It was conducted at a 929 bed community teaching hospital with an annual census of 76,488 emergency department visits (Luchessi, Jackson, Peacock, Cerasani, & Swor, 1995).

The fourth research project resulted in 99% sensitivity, with 759 patients enrolled. Verma conducted it in a university hospital emergency department (Verma et al., 1997). The fifth study, by McBride (1997), was the first validation study of family physicians, with the result of 95% sensitivity, with 259 patients enrolled. The fact that three studies that were so close to 100% sensitivity impressed McBride. McBride did not mention the study by Verma et al (1997), because the results were not available at the time of McBride's study.

Sensitivity tends to drop when a rule is subjected to the vagaries of the real world, (Stiell et al., 1994, p. 462). Is it necessary to obtain 100% sensitivity? Researchers Luchessi et al., (1995) and McBride (1997) felt that it wasn't necessary. They reasoned that fractures were missed even with radiographic studies, at a rate of

approximately 2-4%. The intention of clinical decision rules is to assist the provider with the interpretation of clinical information. The goal is to provide quality patient care, with emphasis on the belief that an appropriate and safe outcome for the patient is the primary goal (Wasson, Sox, Neff, & Goldman, 1985). Even though the issue of cost-effectiveness was discussed, the OAR were developed to assist clinicians with clinical decision-making and increasing their clinical astuteness, not for cost-containment (Graham, 1998).

### Ankle Injury

A study of West Point cadets spanning 4 years found that ankle injury was the most common injury sustained by the cadets (Lassiter, Malone, & Garrett, 1989). A study conducted by Jackson, Ashley, and Powell (1974) found that there were approximately 350 ankle sprains evaluated and treated per year at West Point. There were approximately 4,000 total students attending West Point each year during this four-year time frame. A prospective study of 105 injuries during that 4 year period found only three possible tiny avulsions which were not evident via roentgenograms. All but seven of the injuries were inversion injuries. It should be noted that the researchers found that roentgenographic changes following sprains were not associated with disability.

In civilian settings, ankle injury is among the most common injury seen in primary care settings (Tandeter & Shvartzman, 1997). Stiell and colleagues (1992) define the ankle area in their original study. It is divided into two zones: the malleolar zone and the midfoot zone. Standard ankle and midfoot x-rays typically assess these zones. The malleolar zone includes the anatomic structures and the associated soft tissue of the malleolar area, distal six centimeters of tibia, distal six centimeters of fibula, and talus.

The midfoot zone includes anatomic structures and associated soft tissue including the midfoot, navicular, cuboid, cunieforms, anterior process of the calcaneus, and base of the fifth metatarsal.

Both Stiell (1996) and McBride (1997) found that over 95% of ankle injuries are x-rayed, with less than 15% positive for a fracture. The low positive yield for clinically significant fractures is inefficient and may contribute to rising health care costs. Verma et al. (1997) studied 759 patients with blunt ankle trauma (BAT). They were able to apply the OAR, reduce x-rays by 16%, and missed only two fractures when x-rays were not done. One of those fractures was casted. The other was clinically insignificant and was treated in the same manner as a Grade I or II ankle sprain.

#### Eligibility

The eligibility of a patient for the use of the OAR includes: non-pregnant patient, 18 years and older; presenting for the first time in the ambulatory setting, and with no cognitive or sensory impairment (British Columbia Council, 1995; Stiell et al., 1992).

#### Decision-Making

Stiell and co-researchers (1992) state, Physician judgement and common sense should always take precedence over clinical guidelines, which are not meant to be inflexible or dogmatic. (p. 389). Providers always want to make the right decision. If the provider makes the wrong decision then a feeling of chagrin will be experienced. Clinical decision-making is a combination of factors such as judgement, luck, or both. Providers commonly order expensive and excessive diagnostic tests based on the clinician's own chagrin factor (Feinstein, 1985, p. 1259). It is the chagrin factor that is

responsible for many roentgenograms ordered for injuries that have a tiny probability for an osseous fracture. Gerrity, DeVellis, and Earp (1990) found that patient characteristics and the medical problem influence the amount of incertitude built into the clinical encounter, while the provider's characteristics determine the provider's direct response to dubiety. An interesting finding was that male physicians experienced less stress associated with uncertainty than female physicians did. This finding may be significant when comparing the willingness of female and male ANPs to use the OAR.

### Cost-Effectiveness

Cost-effectiveness is a secondary benefit of using the OAR. By using the OAR, Stiell and coworkers (1993) were able to show a reduction of 30% in radiographs, without missed fractures. Studies have found varying results, but all resulted in safely reducing radiographs for ankle injuries, ranging from 16% to 28% (Anis, Stiell, Stewart, & Laupacis, 1995; McBride, 1997; Pigman, Klug, Sanford, & Jolly, 1994; Verma et al, 1997).

In one year, Canada and the U.S. spend 500 million dollars on ankle radiographs alone. Anis, Stiell, Stewart, & Laupacis (1995) conducted an investigation on the cost-effectiveness of the OAR. They looked at the costs of radiography, waiting time, lost productivity, and medicolegal settlements. They found that the utilization of the OAR would result in significant savings of health care dollars despite the cost of missed fractures including litigation costs (p. 422). They also state, If each lawsuit subsequent to a missed diagnosis was assumed to result in the payment of the maximum amount of indemnity awarded to date in the United States or Canada, adoption of the rules continued

to be a cost-saving alternative (p.426). If the OAR were to be adopted by such a group as the American College of Emergency Physicians then chance of successful litigation for a missed fracture would be very greatly decreased.

## CHAPTER THREE: METHODS

### Research Design and Procedures

The research design for this study was descriptive. The data was gathered from a tool designed by the researcher and reviewed by a panel of experts. The descriptive design afforded the opportunity to obtain comprehensive information about ANPs, their specialties, practice settings, and their knowledge of the Ottawa Ankle Rules. This study provided the opportunity to examine these characteristics and describe them. It identified problems with practice and determined what others would do under similar circumstances.

The questionnaire was mailed to Chief Nurses at all AMEDD patient facilities for distribution to assigned ANPs. The data collection was completed by December 31, 1998. The subjects were guaranteed assured anonymity and provided with return envelopes. No follow-up mailings were done because the response rate was 90%. Two subject matter experts reviewed the questionnaire for content validity.

### Sample

Because of the small size of the total population, the questionnaire was sent to all 105 active duty Army Nurse Practitioners with a specialty of Adult, Women's Health, or Family. Ninety-four questionnaires were returned. Four were excluded because the nurse practitioners were no longer on active duty.

### Measurement

The three parts of the questionnaire addressed demographic data, military characteristics, clinical practice setting, and adherence to the OAR (Appendix A).

Included in the questionnaire will be an foot/ankle diagram used with permission. The questionnaire also included an ankle/foot diagram used with permission (Appendix B). Each question was answered by placing a check in the appropriate box. Several questions required a check mark entry, and a two-three word explanation. The clinical decision-making questions regarding foot and ankle injuries were presented in a yes or no format. The end of the questionnaire contained space for additional comments, as well as the e-mail address of the researcher for further comments or questions. The OAR were not mentioned in the questionnaire nor was the concept of clinical decision rules. This tool was not validated prior to this study.

#### Human Rights Protection

The study sample consisted of active duty ANPs with a specialty of Adult, Women s Health, and Family. Approval was obtained from Uniformed Services University of the Health Sciences institutional review board, the Army Nurse Corps, and the individual installation s commanders or institutional review boards, as required. The subject data were coded to maintain anonymity and ensure privacy, and the master list was destroyed after data entry was completed.

#### Plan for Data Analysis

In an effort to avoid confusion, all data from a single subject were kept together until analysis began; the subject s code number was written on each page of the survey; the data was stored in a locked area.

Data were carefully checked and problems corrected before the researcher entered the data. The researcher entered all the data in order to avoid mistakes or disruption in

flow.

Data entry periods were limited to two hours at a time to reduce errors. A backup of the database will be made after each data entry period. Data entry was completed by March 31, 1999.

After all data were entered into SPSS (1997), summary measures of key variables, including frequency distributions, means, and standard deviations were conducted. Cross tabulations of key variables were made.

## CHAPTER FOUR: DATA ANALYSIS

### Introduction

The purpose of this study was to determine whether Army Nurse Practitioners (ANPs) use the Ottawa Ankle Rules in their clinical practice. This chapter will give an overview of the data collected. It will describe sample demographics, military characteristics, clinical setting and clinical practice. The accuracy of response to 10 clinical presentations using the OAR was analyzed. The method for this study was descriptive, and ANPs composed the study sample. The student researcher developed the questionnaire.

### Study Sample

After IRB approval by the Uniformed Services University (Appendix C), 105 questionnaires were mailed to all ANPs with a specialty of Adult, Family, and Women's Health. The return rate was 90%. Of the 94 surveys returned, 90 were from active duty ANPs and were used for data analysis. In addition four questionnaires were received from individuals who are no longer in the Army Nurse Corps (ANC), and thus were not included in the data analysis.

### Sample Characteristics

The average age of the respondents was 41, ranging from 29 to 54 years. Nearly 70% of the respondents were females and had been in the ANC for an average of 13 years, with a range of 1-22 years. The respondents with less than seven years in the ANC were all female (Table 1). The average years as a nurse practitioner (NP) for all respondents, was four, with a range from less than one month to 16 years (Table 2). The

majority of respondents reported the rank of major (Table 3) with an average of four years as a NP, and 13 years in the ANC. Ninety-six percent of the respondents were currently practicing as NPs. The four respondents not currently practicing had been NPs an average of five years. All of the captains were currently practicing in the NP role. The majority of the respondents were Family Nurse Practitioners (FNP).

Eighty-six percent of the respondents were stationed in the United States, 14% percent were overseas (OCONUS). Nine (10%) of the respondents were currently assigned to a FORSCOM (Forces Command) unit. Nineteen of the respondents were combat veterans, being Desert Shield/Desert Storm veterans, and two were also Vietnam veterans. OOTW (Operations other than war) deployments were reported by 17 (19%) of the 90 respondents, but it is not known whether those deployments had taken place while they were NPs. These deployments included Operation Uphold/Restore Democracy, MEDFLAG-Botswana, Operation Restore Hope- Haiti, Peacekeeping-Bosnia, Kurd refugees-Guam, Operation Joint Endeavor.

A total of 42% of respondents reported involvement in a readiness exercise. These included a variety of such exercises: Team Spirit-Korea, JRTC (Joint Readiness Training Center) rotation, FTX (Field Training Exercise), ARTEP (Army Training and Evaluation Program), Roving Sands, PROFIS (Professional Filler System) training, Bright Star, Reliable Strike II, MASCAL (Mass Casualty) training, DEPMEDS (Deployable Medical System) training, Operation Dusty Bull, and Operation Cold Wind (Table 3).

**Table 1.****Age and Gender, U.S. Army Nurse Practitioner Respondents**

<i>Characteristic</i>	<i>Number</i>	<i>Percent</i>
Age		
30-40	44	49
41-50	43	48
51-60	3	3
Gender		
Female	61	68
Male	29	32

**Table 2.****Characteristics of U.S. Army Nurse Practitioner Respondents**

<i>Characteristic</i>	<i>Number</i>	<i>Percent</i>
Army Nurse Corps Years		
Less than 5 years	4	4
6-10 years	16	18
11-15 years	57	63
16-20 years	12	13
21+ years	1	1
Nurse Practitioner Years		
Less than 2 years	27	30
2-6 years	42	47
7-11 years	16	18
12+ years	5	6
Currently Practicing		
Yes	86	96
No	4	4
Specialty		
Adult	27	30
Family	53	59
Women s Health	10	11

**Table 3.****Military Characteristics of U.S. Army Nurse Practitioner Respondents**

<i>Characteristics</i>	<i>Number</i>	<i>Percent</i>
Rank		
Captain	16	18
Major	58	64
Lieutenant Colonel/Colonel	16	18
Continental U.S. (CONUS)	77	86
Outside the Continental U.S. (OCONUS)	13	14
Forces Command (FORSCOM)		
Yes	9	10
No	81	90
Combat		
Yes	19	21
No	71	79
Operation Other than War (OOTW)		
Yes	17	19
No	73	81
Readiness Exercises		
Yes	38	42
No	52	58

**Practice Setting**

The majority of ANPs practiced in a MEDDAC (Community Hospital); while one-third practiced in a MEDCEN (Medical Center). (Table 4). Of the six that checked other, only three specified the type of facility and described it as an overseas outlying clinic.

**Table 4.****Military Facility in Which U.S. Army Nurse Practitioner Respondents Practiced**

<i>Facility</i>	<i>Number</i>	<i>Percent</i>
Medical Center	30	33
Community Hospital	48	53
Troop Medical Clinic	6	7
Other	6	7

One-half of the respondents (n=47) reported they currently practiced in a family practice clinic (Table 5). Six were Adult Nurse Practitioners, and the remaining were FNPs. Eleven Women's Health Nurse Practitioners (WHNP) reported working in an obstetrics and gynecology clinic. Eleven respondents practiced in an internal medicine clinic, one was a FNP, and the others were Adult Nurse Practitioners. Of the respondents who checked the category 'other' as their clinical setting, six rotated among clinics, and two worked in the Emergency Room.

**Table 5.****Military Clinical Setting in Which U.S. Army Nurse Practitioner Respondents Practiced**

<i>Clinic</i>	<i>Number</i>	<i>Percent</i>
Family Practice	47	53
OB/GYN	11	12
Adult Primary Care	8	9
Health Prevention	3	3
Internal Medicine	11	12
Nurse Practitioner	1	1
Troop Medical	1	1
Other	8	9

The mean number of patients seen in eight hours was 17, with a range of zero to 40. When delineated by specialty, the Adult Nurse Practitioners saw an average of 14 patients in eight hours. The FNP's saw an average of 19 patients during the same period, and the WHNP's treated 15 patients in eight hours on the average.

Ankle injuries seen by all providers in a month averaged 10, with a range from zero to 100 (Table 6). The Adult Nurse Practitioners saw an average of eight ankle injuries a month. In comparison, the FNP's treated an average of 13 ankle injuries a month, and the WHNP's treated an average of only 1 ankle injury every few months. One quarter of the respondents did not treat ankle injuries at all. Two FNP's reported treating approximately 100 ankle injuries a month. One respondent worked in a family practice

clinic while the other reported rotating between clinics.

Most respondents (98%) reported having radiographic capabilities within the same structure as their clinical setting. Almost 30% of respondents reported reading the x-rays they ordered. Whether those x-rays were ankle x-rays only or all types of x-rays was not specified.

**Table 6.**

**Number of Ankle Injuries Treated Per Month by U.S. Army Nurse Practitioner Respondents per Specialty**

<i>Ankle Injuries</i>	<i>Number</i>
Adult Nurse Practitioner	
Mean	8
Range	0-60
Family Nurse Practitioner	
Mean	13
Range	0-100
Women s Health Nurse Practitioner	
Mean	.2
Range	0-2

The respondents were asked how much time was scheduled for new patients. Most respondents reported having between 15-30 minutes for new patients. Two NPs who worked in Emergency Rooms reported no set time . Four NPs reported three-quarters of an hour for new patient appointments. Three were Adult NPs divided evenly between a Health Promotion Clinic, an Internal Medicine Clinic, and an Adult Primary Care Clinic. The fourth was a new FNP working in a Family Practice Clinic.

The majority of Adult NPs and Family NPs saw new patients in a 15-20 minute appointment. The majority of WHNPs saw new patients during a 26-30 minute appointment time frame.

### Discussion of Guideline Adherence

The focus of this study was on the question: Are Army Nurse Practitioners using the Ottawa Ankle Rules (OAR) to evaluate ankle and foot injuries? . To obtain data to answer this question, respondents were provided a patient clinical scenario with 10 different clinical presentations describing an ankle or foot injury and an OAR diagram. The patient's clinical scenario remained consistent for all ten clinical presentations, and had been used in clinical studies that validated the OAR. They were not given any information regarding the OAR. In the patient clinical scenario, the patient is non-pregnant, 18 years or older, presenting for the first time in the ambulatory setting, and has no cognitive or sensory impairment. The respondents were then asked to respond yes or no to whether they would order a x-ray for each of the clinical presentations. The 10 clinical presentations were arranged to elicit a mix of yes or no responses. A Yes response was correct for clinical presentation 1, 2, 3, 6, 7, 8. While no was correct for 4, 5, 9, 10.

Thirty respondents (33%) provided correct responses for all 10 presentations. Another 22 respondents (24%) gave only one incorrect response. The average percentage of correct responses to each of the 10 presentations was 86, with a range from 59 to 95%. Clinical presentation one, which was a distracter, had the lowest percentage, 59%, of correct responses. Clinical presentation six, which was not a distracter, had the highest

percentage of correct responses, 95% (Table 7). The clinical presentations were divided equally into ankle and foot injury questions. Clinical presentations one through five were ankle injury questions, and six through 10 were foot injury questions. The ankle injury question that had the highest percentage of correct responses was clinical presentation two, 94%. The foot injury question with the highest percentage correct responses was clinical presentation six, 95%.

**Table 7.**

**Number and Percent of U.S. Army Nurse Practitioner Respondents With Correct Responses to all 10 Ankle and Foot Injury Clinical Presentations**

<i>Presentation</i>	<i>Number</i>	<i>Percent</i>
1	54	59
2	86	94
3	70	76
4	85	92
5	79	86
6	87	95
7	84	91
8	77	84
9	85	92

Among all 90 respondents, 30 had correct responses to all 10 clinical presentations. Over 80% of all respondents answered at least 80% correctly for all presentations. Eight of 16 (50%) captains answered all of the questions correctly, as did 15 of 58 (25%) of the majors (Table 8). Six of 16 (37%) of the lieutenant colonels and colonels answered all of the questions correctly.

A higher percentage (40%) of FNPs answered all of the questions correctly than did Adult NPs, 30% and WHNPs, 10%. There was essentially no difference between

women and men respondents in the percentage who answered all presentations correctly, 32% and 34%. Interestingly, 47% of respondents who had been deployed to combat answered all correctly versus only 30% of respondents who had never been deployed to combat.

**Table 8.**

**Percent of Correct Responses to all 10 Ankle and Foot Injury Clinical Presentations, by Various Characteristics**

<i>Characteristic</i>	<i>Percent</i>
Average for all 90 Respondents	33
Specialty	
Family Nurse Practitioner	40
Adult Nurse Practitioner	30
Women s Health Nurse Practitioner	10
Rank	
Captain	50
Major	25
Lieutenant Colonel/Colonel	37
Combat Deployment	
Yes	47
No	30
Gender	
Female	30
Male	34

**Summary**

The purpose of this study was to determine if ANPs use the Ottawa Ankle Rules when evaluating ankle injuries. This chapter provided an analysis of the data collected via the questionnaire distributed to 105 ANPs, from whom 90 usable returns were

received. The data showed that correct responses to 10 clinical presentations asking whether a x-ray should be ordered or not, varied from presentation to presentation, with an average correct response of 86%. However, only 33% of respondents answered all presentations correctly. A higher percentage, 40%, of FNPs had correct responses to all 10 clinical presentations than did the adult nurse practitioners, 30% and women's health nurse practitioners, 10%. Those respondents who were captains had the highest percentage of correct responses, 50%, when compared to respondents in higher ranks. Among respondents who were war veterans, 47% had correct responses to all clinical presentations compared to 30% of respondents who were not war veterans.

## CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

### Introduction

This descriptive study revealed whether Army Nurse Practitioners were using the Ottawa Ankle Rules (OAR) to evaluate ankle and foot injuries. The study was conducted via a mailed survey, and included all Family, Adult, and Women s Health U.S. Army nurse practitioners.

The respondents included were active duty, male and female, ranging in age from 29 to 54 years. The reported ranks included captain, major, lieutenant colonel, and one colonel. The study employed a tool designed by the researcher. One hundred five surveys were mailed and 94 were returned. Ninety surveys were included in the study, since four of the surveys were from nurse practitioners no longer on active duty, and therefore were not included.

### Discussion of Guideline Adherence

The research question this study addressed was, Are Army nurse practitioners using the Ottawa Ankle Rules to evaluate ankle and foot injuries? When presented with a consistent scenario and 10 clinical presentations based on the OAR, only 30 of the respondents provided correct responses in accordance with the OAR to all 10 clinical presentations. Seventy-two respondents, provided correct responses for at least eight of the clinical presentations.

Fifty percent of the captains provided correct responses to all 10 clinical presentations, whereas only 25% of the majors and 37% of the lieutenant colonels and colonels did the same. The one colonel included in the study furnished correct replies to

all 10 clinical presentations. Fifty-six percent of the captains reported being a nurse practitioner for less than two years, and all but one of the 16 reported being a nurse practitioner less than 6 years. The more recent schooling and therefore up-to-date information may explain the higher percentage of all correct responses from the captains, when compared to the majors of whom 31% reported being a nurse practitioner less than two years. None of the lieutenant colonels or colonels had been nurse practitioners less than two years.

As has been mentioned, 37% of the lieutenant colonels and colonels rendered correct replies to all 10 clinical presentations compared to 25% of the majors. An explanation for this difference is, perhaps, the fact that only 40% of the lieutenant colonels and colonels reported being NPs less than six years compared to 81% of the majors. Another interesting fact was that all of the lieutenant colonels answered 8 or more (80%) of the 10 clinical presentations correctly. The respondents, who answered 7 or less of the 10 clinical presentations correctly, were captains or majors.

A higher percentage (40%) of FNPs answered all of the 10 clinical presentations correctly than did ANPs, 30% and WHNPs, 10%. This may be due to the fact Possibly due to the fact that FNPs saw more ankle injuries on average than the other specialties, and are more familiar with the OAR.

There was essentially no difference between female and male respondents in the percentage answering all presentations correctly, 32% and 34%. However, 86% of females answered 70% or better for all presentations, compared to 100% of the males That may be explained by the amount of males within the specialties, for example, there

was only one male WHNP. Whereas, the largest amount (18) of men were FNPs. Also, research indicates that men are more comfortable with risk-taking than females, and perhaps more willing to utilize a guideline such as the OAR.

Forty-seven percent of respondents who had been deployed to combat furnished correct replies versus only 30% of respondents who had never been deployed to combat. Also, there two respondents who had been deployed for all three types of deployments: combat, OOTW, readiness exercises, and answered all presentations correctly. The three types of deployments discussed in this study were combat, OOTW, and readiness exercises. Historically, ankle injuries have been the number one injury treated during deployment situations giving the two respondents more experience with these injuries.

Oddly enough those respondents who reported treating no ankle injuries performed much better than those who reported treating over 30 ankle injuries in a month. Only one of the four respondents treating over 60 ankle injuries per month answered all correctly.

What would the outcome have been if an incorrect response were given to one of the 10 clinical presentations? The highest percentage of respondents answered clinical presentation one incorrectly, by saying they would not have ordered an x-ray, when according to the OAR they should have. If they had not ordered an x-ray, then the next question would have been, What type of treatment did they order for this patient? . If they treated this injury as a Grade I ankle sprain with rest, ice, compression, elevation, and anti-inflammatories, that would have been appropriate treatment if there had been a small fracture or if not.

Eight respondents answered clinical presentation 10 incorrectly, and did not order an x-ray. According to the OAR an x-ray should have been ordered. The patient in that presentation was unable to bear weight, and perhaps had sustained a Grade II or Grade III sprain. If it was Grade II sprain, then most likely the treatment would have been the same whether it was fractured or not. If it were a Grade III then the recommendation would have been referral to an orthopedist for which an x-ray would have been required anyway. According to the OAR inability to bear weight would be a key indicator for the presence of a fracture. There would not have been any repercussion if the ankle injury had been treated appropriately.

Clinical presentation number three provided an example of what the outcome would be if an incorrect response were given. Clinical presentation three did not require a x-ray, but yet 20 of the respondents answered that they would have done so. The cost of an ankle x-ray at one Army facility was 28 dollars, therefore the total x-ray cost for all 20 practitioners for clinical presentation three would have been 560 dollars. Also, the wasted time of the patient needs to be considered as well as unnecessary exposure to radiation.

The majority of ANPs are not consistently utilizing the OAR. Eighty percent of the respondents utilized the OAR 80% of the time. Respondents who were captains, had combat experience and were FNP's were utilizing the OAR with most consistency.

#### Recommendations for Practice

There are several ways in which to educate ANPs about the OAR. The scenarios used in the study could be circulated and those responding to them offered continuing

afford the readers continuing education credits. They could be distributed via email to all ANPs. Findings from this study could be presented at the appropriate meetings. The study could also be discussed in the quarterly ANC newsletter. Introduction of the OAR could be included in the NP orientation at each facility.

### Recommendations for Future Research

The results of this research indicate the need for further study in such areas as clinical guidelines, continuing education, and orientation of Army Nurse Practitioners. Also, further research is needed into the subject of ankle and foot injuries. Another study could examine the relationship between those deployed during combat and their increased utilization of the Ottawa Ankle Rules.

Guidelines provide a safe and effective way to guide an individual practitioner. Research based clinical guidelines are being developed for all types of situations. A study of how nurse practitioners view clinical guidelines, and if and how they utilize them would provide another useful perspective. Other issues that could be researched are the types of continuing education nurse practitioners are pursuing and the kind of orientation they receive at their facilities.

A chart audit and cost comparison of x-rays for ankle and foot injuries in accordance with the OAR would be interesting. It would also be interesting to compare types of providers, and their x-ray order patterns for ankle and foot injuries. Are physicians or physician assistants more likely to utilize the OAR?

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## **APPENDICES**

Appendix A: Survey

Appendix B: Ankle Diagram Permission

Appendix C: USUHS IRB Approval

Appendix D: BAMC IRB Approval

Appendix E: MAMC IRB Approval

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## Appendix A: Survey

## PRIVACY ACT STATEMENT

In accordance with the Privacy Act of 1974 (Public Law 93-579), this notice informs you of the purpose of the questionnaire and how the findings will be used. Please read it carefully.

Authority: 10 United States Code 451 note.

Principle Purpose: The purpose of this research is to gain information about how Army nurse practitioners decide to order radiography for ankle and foot injuries. Determining whether the provider uses a specific decision rule to determine whether to order radiography will be helpful for promoting further education of advanced practice nurses in regard to decision rules. Findings will be reported as aggregate data and printed in a thesis manuscript available at the Uniformed Services University of the Health Sciences,

Routine Uses: None.

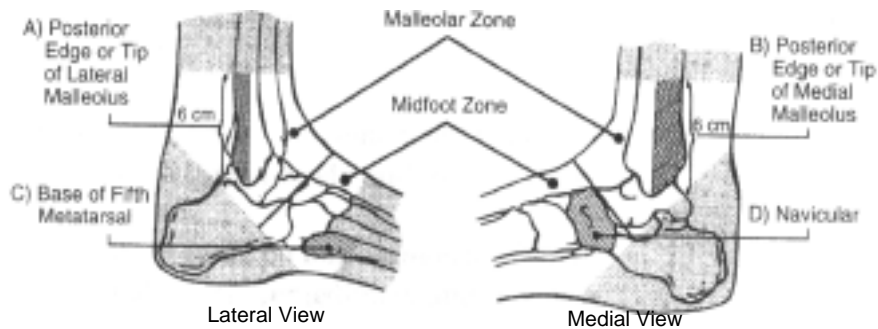
Disclosure: Providing information on this questionnaire is voluntary. There is no penalty if you choose not to respond. This study involves no physical risks or discomfort to you. Completion of the questionnaire implies consent to participate. However, maximum participation is encouraged so that the data will be complete and representative. Your questionnaire form will be treated as confidential. No coded identifying information is found on the questionnaire. Participants will remain anonymous throughout the study. Only group statistics will be reported.

### Ankle and Foot Injury Questions

**For each question listed on the right(1-10), the scenario includes a patient with an acute ankle or foot injury.**

**You will be asked whether or not you would order an X-ray for the patient based on the clinical presentation described. Each patient is non-pregnant, 18 years or older, presenting for the first time in the ambulatory setting, and has no cognitive or sensory impairment.**

**For all questions please use this diagram when deciding whether or not to order an xray.**



Used with permission

**For each clinical presentation, would you order an xray for this patient? Please refer to the picture to the left. (Place a check by the answer that applies.)**

	<b><u>ORDER XRAY</u></b>	
	<b>Yes</b>	<b>No</b>
<b>1. Pain in the malleolar zone, bone tenderness at the posterior edge or tip of the lateral malleolus, AND able to bear weight both immediately after the accident and in your office</b>		
<b>2. Pain in the malleolar zone AND bone tenderness at the posterior edge or tip of the medial malleolus</b>	<b>Yes</b>	<b>No</b>
<b>3. Pain in the malleolar zone, no bone tenderness at the posterior edge or tip of the lateral malleolus, AND able to bear weight both immediately after the accident and in your office</b>	<b>Yes</b>	<b>No</b>
<b>4. No bone tenderness at the posterior edge or tip of the medial malleolus AND pain in the malleolar zone</b>	<b>Yes</b>	<b>No</b>
<b>5. Pain in the malleolar zone AND inability to bear weight both immediately after the accident and in your office</b>	<b>Yes</b>	<b>No</b>
<b>6. Pain in the midfoot zone AND bone tenderness at the base of the 5th metatarsal</b>	<b>Yes</b>	<b>No</b>
<b>7. Bone tenderness at the navicular AND pain in the midfoot zone</b>	<b>Yes</b>	<b>No</b>
<b>8. Pain in the malleolar zone, no bone tenderness, AND able to bear weight both immediately and in your office</b>	<b>Yes</b>	<b>No</b>
<b>9. Pain in the midfoot zone, no bone tenderness, AND able to bear weight both immediately and in your office</b>	<b>Yes</b>	<b>No</b>
<b>10. Pain in the midfoot zone AND inability to bear weight immediately and in your office</b>	<b>Yes</b>	<b>No</b>

**Demographic Data** (Please place a check mark for each question or enter appropriate data in space available)

1. Age: \_\_\_\_\_
2. Sex: F \_\_\_\_\_ M \_\_\_\_\_
3. Years active duty ANC \_\_\_\_\_
4. Years worked as a NP \_\_\_\_\_
5. Rank \_\_\_\_\_
6. Are you currently practicing as an N.P.? Yes \_\_\_\_\_ No \_\_\_\_\_
7. What is your NP specialty? (check all answers that apply):  
\_\_\_\_1. Adult \_\_\_\_\_3. Pediatrics \_\_\_\_\_5. Other (Please specify) \_\_\_\_\_  
\_\_\_\_2. Family \_\_\_\_\_4. Women's Health
8. What is your current geographic location?: \_\_\_\_\_CONUS \_\_\_\_\_OCONUS
9. Do you currently hold a FORSCOM position?: Yes \_\_\_\_\_ No \_\_\_\_\_
10. Past Deployments (check all that apply):  
\_\_\_\_1. Combat (please specify) \_\_\_\_\_  
\_\_\_\_2. Operations other than war (please specify) \_\_\_\_\_  
\_\_\_\_3. Readiness exercises (please specify) \_\_\_\_\_  
\_\_\_\_4. Other (please specify) \_\_\_\_\_

**Clinical Practice Setting**

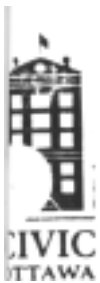
11. What type of facility do you practice in? (check all answers that apply):  
\_\_\_\_1. MEDCEN \_\_\_\_\_3. TMC  
\_\_\_\_2. MEDDAC \_\_\_\_\_4. Other (Please specify) \_\_\_\_\_
12. What clinical setting do you work in? (please check all answers that apply):  
\_\_\_\_1. Emergency Room? \_\_\_\_\_3. OB/GYN Clinic \_\_\_\_\_5. Other (Please Specify) \_\_\_\_\_  
\_\_\_\_2. Family Practice Clinic \_\_\_\_\_4. Pediatric Clinic
13. Below are listed six duties common to most nursing practice. Indicate what percentage of time each month is spent on each duty. Enter "0" for any duty that you do not perform. When you have entered the six percentages, please add them together to make sure they total 100%.

a. Clinical Practice:	_____%
b. Administration	_____%
c. Teaching:	
Staff Education	_____%
Patient Education	_____%
d. Research	_____%
e. Other (Please specify) _____	_____%
	<u>100%</u>
13. What is the average number of patients you see per 8 hour period?: \_\_\_\_\_
14. How many ankle/foot injuries do you treat (on average) on a monthly basis in your current practice?: \_\_\_\_\_
15. Do you have radiographic capabilities in your current practice? \_\_Yes \_\_No
16. Do you read your own X-rays? \_\_Yes \_\_No
17. How much time, in minutes, does your facility provide for a patient visit? (Place an answer for each item):

	Minutes
a. New patient	_____
b. Established patient	_____
c. Follow-up visit	_____
d. Other (please specify) _____	_____

**Thank-you!!!!!!**

## Appendix B: Ankle Diagram Permission



Ottawa Civic Hospital  
Loeb Research Institute  
Institut de recherche Loeb de  
l'hôpital Civic d'Ottawa

1000 Carling Avenue  
Ottawa, Ontario  
K1Y 4E9

Telephone: (613) 737-8100

Epidemiology Unit  
Stell, MD, MSc, FRCPC  
Principal Investigator  
(3) 798-5555 Ext. 8688

February 25, 1998

Captain Elizabeth Wall  
4850 Connecticut Ave. NW #402  
Washington, DC 20008 U.S.A

***Re: Permission to use ankle/foot pictures***

Dear Captain Wall:

Thank you for your recent letter requesting permission to use the pictures of the ankle/foot that appeared in my article in Canadian Family Physician, March 1996.

I have no objection to your use of the pictures of the lateral and medial view of the ankle/foot illustration from the above-noted article.

Yours sincerely,

Ian G. Stiell MD, MSc, FRCPC

IGS/ep

Le Centre de recherche approuvé  
par le Service de la Revenu Canada  
Research Institute



Université d'Ottawa/  
The University of Ottawa

## Appendix C: USUHS IRB Approval



UNIFORMED SERVICES UNIVERSITY OF THE HEALTH SCIENCES

4301 JONES BRIDGE ROAD  
BETHESDA, MARYLAND 20814-4799



July 24, 1998

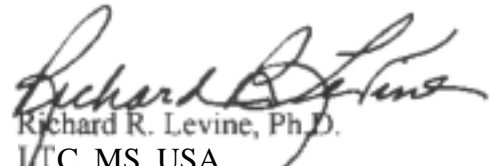
MEMORANDUM FOR CAPT. ELIZABETH WALL, GRADUATE SCHOOL OF NURSING

SUBJECT: IRB Review and Approval of Protocol **T06179** for Human Subject Use

Your research protocol, entitled "*Application of Ottawa Ankle Rules to Evaluate Ankle and Foot Injuries by Army Nurse Practitioners*," was reviewed and approved for execution on **7/22/98** as an exempt human subject use study under the provisions of 32 CFR 219.101 (b)(2). This approval will be reported to the full IRB scheduled to meet on 8/13/98

The IRB understands that this study uses a questionnaire to compile data on treatment of ankle injuries by Army nurse practitioners in order compare and evaluate practices in various nursing specialties and settings. Subjects will be identified by code number only, and the master list correlating subject names and codes will be destroyed when data entry is complete.

Please notify this office of any amendments or changes in the approved protocol that you might wish to make and of any untoward incidents that may occur in the conduct of this project. If you have any questions regarding human volunteers, please call me at 301-295-3303.

  
Richard R. Levine, Ph.D.  
LTC, MS, USA  
Director Research Programs and  
Executive Secretary, IRB

cc: Director, Grants Administration

## Appendix D: BAMC IRB Approval



DEPARTMENT OF THE ARMY  
BROOKE ARMY MEDICAL CENTER  
FORT SAM HOUSTON, TEXAS 78234-6200

REPLY TO  
ATTENTION OF


MCHE-CI (15 a)

19 Oct 1998

MEMORANDUM FOR CPT Elizabeth Wall, Graduate School of Nursing, USUHS

SUBJECT: Exempted status of protocol entitled: "application of Ottawa ankle rules to evaluate ankle and foot injuries by Army nurse practitioners"

1. The undersigned has reviewed the aforementioned protocol and judged it to satisfy the criteria for Exempted status as specified in AR 40-38, App B-2 (Health care delivery and epidemiology).
2. This action will be reported at the next meeting of the Institutional Review Board on 5 Nov 98. The protocol will be designated **C 99-003e** at BAMC and will require submission an Annual Report by 15 October 1999.
3. A courtesy copy of this action will be forwarded to LTC Dennis Driscoll, Nursing Research Service. If you have any questions regarding this protocol, please contact the undersigned at (210) 916-1005 (DSN 429).

  
Arnold A. Asp  
COL, MC  
AC, DCI

## Appendix E: MAMC IRB Approval

## ROUTING AND TRANSMITTAL SLIP

Date

10 November 1998

TO:				Initials	Date
1. COL Roderick F. Hume, Jr.					10/11/98
2.					
3.					
4.					
5.					
X	Action		File		Note and Return
	Approval		For Clearance		Per Conversation
	As Requested		For Correction		Prepare Reply
	Circulate		For Your Information		See Me
	Comment		Investigate		Signature
	Coordination		Justify		

## REMARKS

SUBJECT: Research Study: Application of Ottawa Ankle Rules to Evaluate Ankle and Foot Injuries by Army Nurse Practitioners by CPT Elizabeth Wall, MC

The attached protocol is forwarded for review/approval. I recommend exempt category since CPT Wall is at UHS and the introduction letter is signed by her, and also we would have to change the principal investigator to Lori Loan if we do an expedited review.

The questionnaire is completely anonymous.

*Agree Exempt*

AE-0199

EXEMPTION: EDUCATION/RE ASSESSMENT  
(BSC/Qualification) EVALUATION OF  
ANP on "Ottawa Ankle Rules" (BSC)

FROM:	Phone number
Nancy Whitten Protocol Manager	968-0149

## Appendix F: Chief Nurse Letter

15 September 1998

MEMORANDUM FOR Chief Nurse

SUBJECT: Distribution of Thesis Questionnaire for Captain Elizabeth Wall

1. Hello! I am a graduate student at the Uniformed Services University of the Health Sciences (USUHS) in the family nurse practitioner program. As part of my master's program, I am completing a thesis entitled "Application of the Ottawa Ankle Rules to Evaluate Ankle and Foot Injuries by Army Nurse Practitioners". The proposal has been defended and received an "exempt" status by the USUHS IRB Board.

2. The Ottawa Ankle Rules (OAR) were developed to provide clinicians with a safe method of determining whether ankle and foot injuries require radiographs. Research indicates that 95% of all ankle and foot injuries are radiographed; yet only 15% of those are positive for a fracture. Annually, the United States and Canada spend approximately 500 million dollars a year on ankle and foot injuries. Between 1992 and 1997, seven (7) studies using the OAR determined the instrument sensitivity was between 93-100%.

3. Ankle injuries are one of the most common injuries sustained during deployment and training exercises. Upon deployment, Army Nurse Practitioners will most likely be responsible for the care of adult patients sustaining ankle and foot injuries. Therefore ANPs in all specialties, except pediatrics should be aware of the OAR, in order to conserve human resources, decrease loss of unit integrity, and reduce medical evacuation. The OAR would allow the ANP to make safe, responsible decisions, locally. Providing safe patient care and conservation of resources are just two of the numerous responsibilities of ANPs.

4. I would appreciate your assistance in data collection. I have enclosed a separate instruction sheet for the person designated to distribute and collect the enclosed questionnaires. I will need the questionnaires returned to my by **20 November 1998**. A return envelope with postage paid is enclosed.

5. Upon completion of the study, I will be more than happy to send you a summary of the results and recommendations. The chairman of my thesis committee is Dr. Carol Ledbetter, Chairman of the Department of Nurse Practitioner and Director of the Family Nurse Practitioner Program. She can be reached at DSN: 295-1992 or [clbetter@usuhs.mil](mailto:clbetter@usuhs.mil).

Elizabeth A. Wall  
CPT, AN  
USUHS, FNP Department

## Appendix G: ANP Letter

19 July 1998

Dear Army Nurse Practitioner,

In the never-ending, ever-changing, exciting world of Army health care, would you spare approximately twenty (20) minutes of your time to answer my questionnaire?

I am graduate student in the family nurse practitioner program at the Uniformed Services University of the Health Sciences in Bethesda, MD. As part of my program requirements, a thesis must be completed. My thesis topic concerns foot and ankle injuries.

All Army Nurse Practitioners will be surveyed. The enclosed questionnaire includes demographic data, and questions concerning how you make decisions about ordering radiographs for foot and ankle injuries. While this study may not help you personally, it may provide useful information to help health care providers and the military with the use of decision rules. Please read the attached Privacy Act Statement. Should you desire results, please contact me via email address: [ewall3000@aol.com](mailto:ewall3000@aol.com).

This thesis research is conducted under the direction Carol Ledbetter, Ph.D, RNc, CS, FNP. Should any questions or concerns arise, you may contact her at 301-295-1992.

In order to allow me to meet required deadlines, please return the questionnaire to your chief nurse by **15 November 1998**.

I ask you to please take time to help me complete my education and to support research which may have an impact on the future of military health care. I thank you for your assistance and cooperation!

Sincerely,

Elizabeth A. Wall  
CPT, AN  
USUHS, FNP Department